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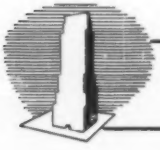

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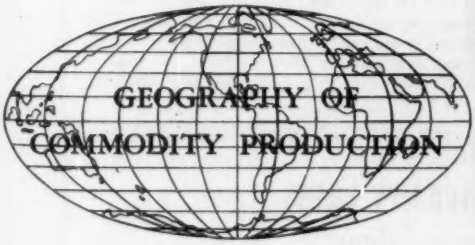

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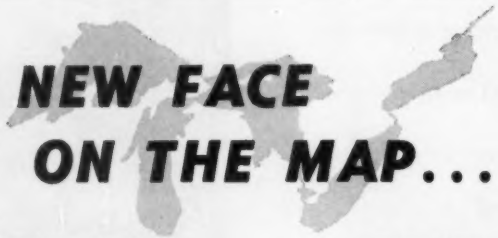

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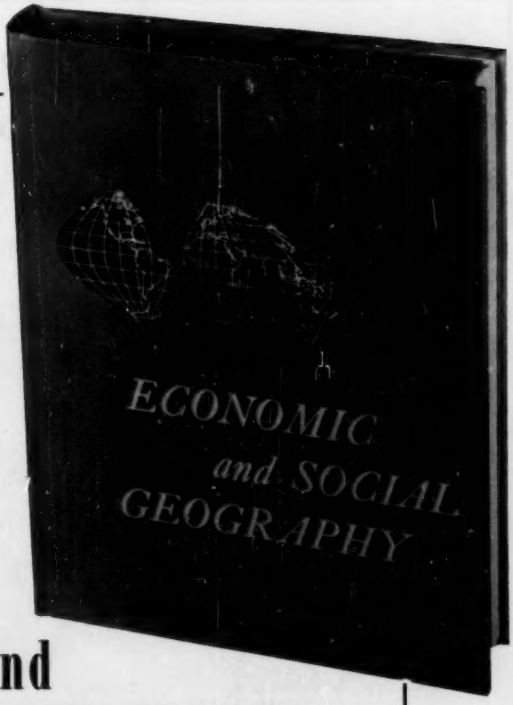

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OBSERVATIONS IN THE PIONEER FRINGE OF WESTERN CANADA

BURKE G. VANDERHILL
Florida State University

A number of years ago the term "pioneer fringe" was given currency by the writings of Isaiah Bowman.[1] The term was applied to zones of active agricultural settlement and pioneer living along the margins of well developed farming areas. The Canadian provinces of Manitoba, Saskatchewan, and Alberta provide an excellent opportunity for geographic investigation in one of the world's contemporary pioneer fringes.

The present study, based on field reconnaissance all along the margins of settlement in western Canada, attempts a delineation and interpretation of the fringe area as it exists today—a meaningful feature in the panorama of North America.

THE PIONEER FRINGE DELINEATED

In the early years of the present century, when the settlement of the prairie lands and park belt—the prairie-forest transition zone—in Manitoba, Saskatchewan, and Alberta was virtually complete, farmers or would-be farmers began to look northward for virgin land within the margins of the forest which covers a surprisingly large part of the so-called Prairie Provinces. The frontier of settlement spread northward at an irregular pace and at widely separated points. Drought in the prairie and economic depression in urban centers combined in the late twenties and early thirties to accelerate settlement in forested areas. From this largely unplanned, uncoordinated, and undirected development emerged a continuous zone of pioneer living—a pioneer fringe.

Today's pioneer fringe in the Prairie Provinces is a recognizable zone which can be traced from the Lake of the Woods north-

[1] Especially influential was his book, *The Pioneer Fringe*, Special Publication No. 13 American Geographical Society, New York, 1931.

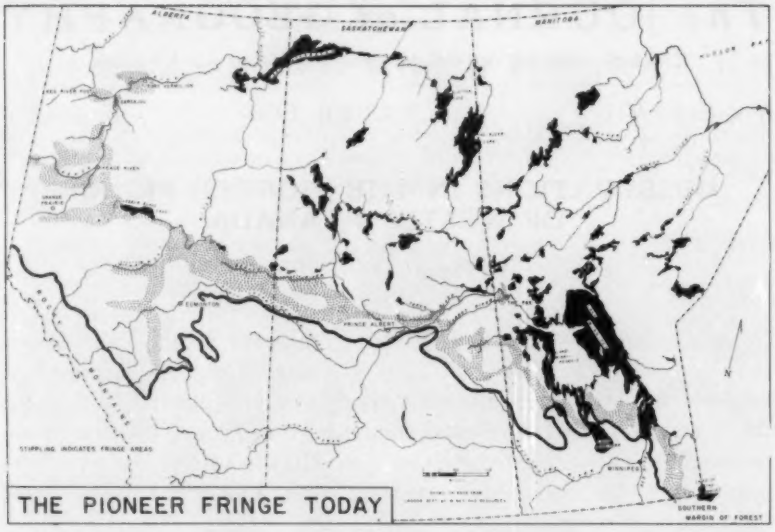

FIG. 1

westward to the foothills of the Rocky Mountains (Fig. 1). It is roughly parallel to the southern border of the forest and usually set back some distance—a varying quantity—from that border. Comprising a narrow zone southeast of Winnipeg, where it is crowded between the prairies and the edge of the Canadian Shield, the fringe tends to broaden westward and reaches its maximum width in the Peace River area of Alberta. An arm extends southward along the foothills of the Rockies, west and southwest of Edmonton.

Several outlying areas which share in the characteristics of the fringe but lie at some distance from the continuous zone of pioneer farming have been considered by the present writer as detached portions of the fringe zone. These outlyers include the Saskatchewan Delta area near The Pas, Manitoba, the Keg River and Fort Vermilion blocks of northern Alberta, and the old Carcajou Settlement, still in a pioneer stage after many years of existence, located along the Peace River upstream from Fort Vermilion.

CHARACTERISTICS OF THE PIONEER FRINGE

The pioneer fringe may be identified in the field by a number of characteristic features. Land-clearing operations are to be seen

FIG. 2. Clearing new farmland with bulldozers in the Carrot River Valley of Saskatchewan.

in most areas; the roar and clatter of bulldozers and the sight and smell of smoke in the air from burning debris are commonplace (Figs. 2 and 3). A small proportion of the land shows evidence of improvement, and there is often a look of rawness in the landscape —piles of debris, some charred from brush-burning operations; scarred and damaged trees along the margins of fields; freshly peeled fence posts or an absence of fencing; the deep furrows of newly-broken fields (Fig. 4). Dwellings and other farm buildings have a crude appearance (Fig. 5). Log structures are frequent, and

FIG. 3. Debris-burning in connection with land clearance along the margin of settlement northeast of Prince Albert, Saskatchewan.

FIG. 4. Breaking virgin land in the Peace River District of Alberta.

since most of the timber of the pioneer zone of the Prairie Provinces has been of limited size, the logs are usually poles of small diameter. Flat, sod-covered roofs are not uncommon, particularly in sections settled during the twenties and early thirties. Even clapboard homes tend to have a rude, unfinished, temporary look about them. There is little evidence of landscaping or home beautification in pioneer fringe farmsteads. Hand pumps are common, but often the domestic water supply is secured by dipping a pail into a spring, a seepage well, or a dugout.[2] The observer gains the impression that life is not easy on the frontier and that levels of living are comparatively low.

There is a striking similarity in the towns of the pioneer fringe. Nearly every one has a broad main street, bespeaking optimism for the future of the community, but one which is unpaved and poorly maintained (Fig. 6). Wallows of mud when wet, these streets become rutted and dusty when dry. If sidewalks exist, they may be constructed of wooden planks. The "shopping district" is almost uniformly made up of one or two-story, false-fronted, frame buildings interspersed with vacant lots. Many communities do not have water or sewer systems. In such cases, water is brought to the consumer in tank trucks or in metal drums from some river or lake, and each kitchen has its water barrel. Pioneer towns are small,

[2] A dugout is a square or rectangular reservoir excavated in a site which allows the accumulation of runoff and seepage water. Dugouts are seldom less than ten feet in maximum depth and range from 5,000 to 10,000 square feet in surface area. Their principal purpose is the watering of livestock, but many farm families secure their domestic water supply from pumps or cisterns associated with them.

FIG. 5. Pioneer farmstead in the Peace River District of Alberta.

ranging in population from a mere handful of people to several hundred, and their urban functions are limited to a certain extent by competition from larger towns situated near the pioneer fringe but not a part of it.

While such characteristics are plainly seen within the pioneer

FIG. 6. Main street in a typical pioneer fringe town, Carrot River, Saskatchewan.

fringe, it is often difficult to establish the exact boundaries of the zone. Approaching the wilderness side of the fringe, the roads usually deteriorate—graded roads replace surfaced roads, then dead-end in the "bush" (Fig. 7). Only a few highways cross the border into the non-agricultural and largely unsettled northern portions of the Prairie Provinces. Occupancy becomes less and less

Fig. 7. Road in an area of active settlement in Manitoba, west of Lake Winnipegosis.

complete; there is more open land and fewer farmsteads. Clearing activities are more frequently encountered, and buildings are generally newer. Finally, farmlands give way to unbroken woodland. There are, however, as indicated earlier, some outlying agricultural areas, far beyond what appears to be the margin of settlement, which are difficult to classify in terms of the pioneer fringe. They are, essentially, detached portions of the fringe. Likewise, there are rather large tracts of unsettled land surrounded or nearly surrounded by settled areas. Some of these are integral parts of the fringe zone, others perhaps should not be so classified.

Approaching the opposite, or inner, side of the pioneer fringe, it is even more difficult to establish the boundary, for within a limited area there may be farms seeming to represent several stages of development. Differences in time elapsed since settle-

ment, in the ability and background of the farmers, or in land quality may be reflected in the appearance of the farms. As the inner margin is neared, the amount of improved land and the quality and number of farm buildings tend to increase. Dwellings usually have an air of greater permanence and comfort. Roads are poor indicators in this case, for they are not noticeably superior south of the margin of the pioneer zone.

Other characteristics of the pioneer fringe are less evident to the casual observer, but may be discovered thru contact with residents or thru analysis of data pertaining to the area. Generally speaking, the rate of farm tenancy is lower here than outside the pioneer zone, due to the fact that most of the farmers occupy lands they themselves homesteaded or purchased as tracts of virgin land. Lower land costs and values undoubtedly play a part in this too. As a corollary, the burden of indebtedness tends to be higher here, for many pioneer farmers are still paying off the initial investment in land, livestock, buildings and equipment. Farming units are somewhat smaller than in better developed farming areas where consolidation of holdings is more common. Horse-drawn equipment is used to a greater degree than elsewhere in western Canada, in spite of the trend toward mechanization. Foreign-born groups especially have clung to the older ways, as have some French-Canadians.

The agricultural economy of the fringe is typically based upon mixed farming and livestock enterprises, while work off the farm brings supplemental income to a great many pioneer farmers. The grains—wheat, oats, and barley—occupy much of the cropland, but a larger share of the improved acreage is devoted to hay and fodder crops, and the grains often reach market in the form of livestock or livestock products. Vegetable crops round out the cropping scheme, both for family use and for local markets. There are some regional or individual agricultural specialties. The planting of alfalfa and varieties of clover for seed production has become significant in Alberta and parts of Saskatchewan. Flax is grown in some Manitoba pioneer areas, and dairying is common in areas within easy reach of such markets as Winnipeg, Prince Albert, and Edmonton. Poles, fence posts, and, rarely, lumber are sold from pioneer farms, and firewood is still in demand both within the fringe zone and in areas nearby.

Problems of the Pioneer Fringe

The settling of new land anywhere generates a myriad of problems for both settlers and administrators. The case of western Canada is no exception. The pioneer fringe in the Prairie Provinces has been a problem area from the beginnings of agricultural development within the forest lands, and most of its problems persist today.

At the root of many of the problems is the physical environment. Most critical in the success or failure of agricultural settlement has been the soil factor. Altho there are patches of excellent soil within the pioneer fringe—those associated with small prairies, areas only recently invaded by forest, and poorly drained areas—the characteristic soil is a podsolic type known as the Grey Wooded Soil. This is often sandy, usually low in essential plant nutrients, productive only if carefully managed and improved, and frequently sub-marginal in times of low crop prices. Contemporary settlers are being steered away from the poorer soils by land administrators; many of their predecessors were not so well advised. Much of the distress of the pioneer fringe can be traced to the poor adjustment of poor farmers to poor soils. Even today, most land units combine sizeable acreages of poor soil with the superior soils which attract new settlement. Abandoned farms attest the mistakes of a few years ago, yet many farmers thruout the fringe zone continue to occupy the Grey Wooded Soils.

Climate poses another set of problems. While average climatic conditions are permissive for agriculture within the fringe area, variations from the statistical norm plague the efforts of the pioneer farmer. Killing frosts may occur at almost any time during the growing season, altho the average frost-free period in most fringe area is adequate for a variety of crops. The unreliability of frost dates is partly offset by the long summer periods of sunlight in these latitudes which allow some crops to mature in less than 100 days. Precipitation during the growing season is ordinarily adequate in the Manitoba and Saskatchewan pioneer areas, but abnormally dry or wet years are sometimes critical. In 1950, for example, heavy rains just before the harvest period destroyed much of the grain crop of these provinces and led to the flooding of some of the lands opened to agriculture thru drainage works. The problem of drought is particularly serious and frequent in the Alberta fringe areas, for they lie within the rain shadow of the

Rocky Mountains. Lowered ground water tables at such times add to the difficulties of an area where deep wells are still rather rare. The pioneer areas share with the prairies to the south the problems of hail damage to crops, for cold front thunderstorms are frequent in the summer months. More rarely, unseasonal snowfall may cause crop loss. Lastly, while agriculture has not reached its northern limits anywhere within the contemporary pioneer fringe, the shortness of the average frost-free season in some areas allows a small range of choice in crops grown and a rather small margin for fluctuation from the average. In other words, considerable risk is involved in farming in the pioneer zone.

Accepting the challenge of the natural environment, the pioneer farmers must cope with numerous economic and social disadvanvantages. Income levels average somewhat lower here than in other parts of the Prairie Provinces because of higher production and transportation costs, smaller acreages per capita of improved land, and higher frequency of crop loss. With a smaller income a pioneer farmer must purchase many goods at higher prices than does his colleague of the prairies. In addition, a considerable portion of his income must be diverted to the retirement of indebtedness on his property. It is obvious that living levels must reflect these factors. Rail rates are often unfavorable because of high construction and maintenance costs and low traffic volume. Roads are usually substandard and at times impassible. Health and medical facilities are inadequate, altho the provincial governments are subsidizing such facilities on an increasing scale. Schools are mainly at the primary level, and many areas are not yet adequately served. Since it is difficult, inconvenient, and costly for farm families to send their children to high schools in distant towns, as is frequently necessary, many youngsters fail to complete their schooling. Underlying the paucity of economic and social services in the pioneer zone is the limited tax base. Local financing is difficult, and the deficiencies are only partially made up by provincial and Dominion assistance.

A discussion of pioneer problems should not close without mention of fire, for much of the pioneer fringe is exceedingly vulnerable to forest fire. Not only are most farms hemmed in by forest or woodlots but fire-fighting facilities are generally inadequate and sometimes entirely lacking. One of the prime causes of fire is debris-burning during the summer months. In spite of precautions, many such fires get out of control each year to menace both timber-

lands and farmsteads. Fires from natural causes may burn for long periods of time.[3] Fire scars are common thruout the fringe zone of western Canada.

Is the Pioneer Fringe a "Perennial Feature?"

Among the concepts of the pioneer fringe held by the late Isaiah Bowman was that of the fringe as a perennial feature of the landscape in which no permanent type of land use could develop.[4] Is this the case in the Prairie Provinces of Canada?

Many portions of the fringe zone today seem to bear out Bowman's contention, for they exhibit conditions of pioneer living decades after the date of settlement. On the other hand, some areas which were parts of the fringe twenty or thirty years ago could scarcely be so classified today. The fringe zone has migrated northward—slowly and unevenly, to be sure—until it lies well within the southern margin of the forest nearly everywhere. Areas with poor Grey Wooded soils tend to maintain their pioneer aspects; those with superior soils generally evolve into agriculturally mature areas. It may be, then, that the ultimate pioneer fringe has not fully developed, but will take form when all of the areas of better soils have passed out of the pioneer phase of occupation.

There is another possibility, of course. Since man, after all, is a very active variable in the land-use equation, it is conceivable that the pioneer fringe might wither away or be obliterated by the agency of man. Abandonment of the poorer lands might accomplish this; some abandonment is in evidence in every part of the pioneer fringe. Technological advances or sheer pressure of population might convert marginal lands into economic holdings. Already mechanization is modifying the pioneering processes. The fruits of research in the various agricultural fields are now available to the frontier farmer. Government financial aid, government subsidies in the form of transportation facilities, schools, drainage works, and medical facilities, and the institution of government or private crop insurance all have improved the lot of the pioneer farmer and hastened his transition to a position of relative permanence and stability.

[3] It is believed by some foresters that when the forest is tinder dry, a droplet of water from rain or dew upon a leaf may serve as a natural burning lens, focusing the sun's rays upon a tiny point on the leaf's surface and igniting it.

[4] Isaiah Bowman, "The Pioneering Process," *Science*, Vol. LXXV (May 20, 1932), p. 525.

Man, however, is not the only variable in the situation. Fluctuations in rainfall and length of frost-free season along the margins of present settlement are frequent and critical to agriculture. Short-term fluctuations lead to distress; long-term fluctuations lead to experimentation and readjustment. Perhaps herein lies the permanency of the pioneer fringe as a landscape feature in western Canada.

One thing, at least, is certain. There will be a pioneer fringe across the Prairie Provinces for many years to come. It may differ in some particulars—including size, shape, and position—from the zone investigated in the present study, but men are going to continue to look northward for land and living space as population further concentrates in the older centers of Canadian settlement.

ARNOLD GUYOT, TEACHER OF GEOGRAPHY

ROBERT L. ANSTEY
Natick, Mass.

Among the many European geographers who have immigrated to the United States, Arnold Henri Guyot (1807-1884) should receive special recognition for his contributions to geographic education. It was largely due to his efforts that the study of geography in this country in the last half of the Nineteenth Century was turned toward the scientific approach being used in Europe by Alexander von Humboldt and Carl Ritter.[1] Guyot wrote a unique series of elementary geography text books and prepared four series of wall-maps for classroom use. The first graduate work in geography in this country, as well as the first transcontinental field trip for advanced geography students at Princeton, was under his direction. He taught at Princeton for 30 years in addition to presenting regular courses at the Trenton Normal School and the Union Theological Seminary in New York. Altho Guyot became a citizen of the United States in 1860, his contributions were essentially those of a European.

[1] William F. Phelps, *The Reform in Geographical Studies in our American Schools: with a Brief Sketch of the Eminent Labors of Professor A. Guyot in connection there with*, Hadley Bros., Chicago, 1871, pp. 1-8.

Immediately after receiving his Ph.D. degree from the University of Berlin in May, 1835, Guyot accepted a position as tutor for the sons of Count de Pourtalès-Gorgier in Paris. He was well prepared for this task because of his experience as a tutor for five years in Berlin with the family of Mr. Muller, Privy Counsellor to Frederick-William III of Prussia. While in Berlin he had taken a wide variety of courses under such men as Ritter, Hegel the philosopher, Dove the physicist, Hofmann the geologist, Steffens the psychologist, and botanical excursions with von Humboldt. In appreciation for their special help, Guyot's doctoral dissertation was dedicated to Ritter and von Humboldt. For his young pupils, Guyot adopted the teaching methods used by Ritter. Carl Ritter had been a student of Johann Pestalozzi, and recognized that his idea of education as a process beginning with observation and passing from observation to consciousness and then to speech, was particularly useful in college-level geographic studies. Applied to classroom geography, this method involved measuring areas on maps, making drawings from these measurements, describing them in writing, and then reciting the facts of areal size, configuration, and distribution. One of Guyot's contributions was the extension of Ritter's method to the grade school level.

Physical Geography a Foundation

Guyot believed that the study of the geography of nature should precede the study of the geography of man. He felt that a knowledge of certain facts of the physical environment is required in order to interpret facts of human distribution. As he stated in *Earth and Man,* "to describe, without rising to causes, or descending to the consequences, is no more science than merely and simply to relate a fact of which one has been a witness."[2] He believed that in order to understand the causal relationships and the consequential interactions of the physical and cultural elements in the region, the student must have geographic facts presented in a logical sequence so that the perception of reality unfolds in the most realistic manner. Under his plan the study of relief, mountains, plateaus, and plains, come before drainage, the river systems, and the distribution of lakes, because the location of the latter group is dependent on the former. Similarly the circulation of ocean and air currents was studied before the study of the distri-

[2] A. Guyot, *The Earth and Man,* Gould, Kendall and Lincoln. Boston. 1849, p. 2.

bution of climates, and climate was studied before vegetation. In each of these studies the causes and consequences were keynoted. Thus, each order of facts was presented in its natural connection, and became a firm foundation for the intelligent study of the next. At that point in Guyot's plan the student was prepared, for example, to better understand the reasons for dense human settlement in some countries and relatively sparse population in others. In his classes on the geography of man, Guyot presented ethnographical facts before political facts. His experience in teaching geographic principles in this order convinced him that this method, modified from that of Ritter, was the most practical approach to the presentation of regional geography in the classroom.

FIELD EXPERIENCE

In actual practice, Guyot was a staunch advocate of von Humboldt's preference for field work in place of classroom exercises whenever possible. He often repeated his belief that the starting point in geographical education should be nature and not books. He meant all of nature, not merely landforms or rock exposures. He felt that geography teachers should take their pupils into the field to note the location of hills, streams, vegetative associations, animal life and areal differences in these conditions with changes in slope and exposure. In this way these pupils could comprehend the natural relationships in the region they were investigating, and at the same time they could obtain a basis for broader geographical study. Guyot's own research efforts were usually based on field investigation. He read widely in French, German, and English literature in order to bring the latest geographic information to his students, but he rarely engaged in pure library research, except to augment the findings of his field work.

TEACHING METHODS

Guyot reflected his background and training in his writing on teaching methods. In the preface of his *Introduction to the Study of Geography,*[3] Guyot states that "The nature of our mind is such, that the acquisition of knowledge is always gradual. That gradual progress whatever be the object of our study, has three main stages. We first take a general outside view of the object, or of the

[3] A. Guyot, *Introduction to the Study of Geography,* Charles Scribner & Co., N.Y., 1866, p. iii.

field to be studied; we then fairly go into the study of all its parts; last of all we derive from this thoro analysis the means of rising to the knowledge of the laws and principles which regulate and pervade the whole, and we combine all its elements in a well-connected organization, in which the mutual dependence of all the parts, and their cooperation to a final end, are clearly understood. The first stage, especially in the study of the globe, and in all the sciences of observation, may be called the *perceptive* stage; the second, the *analytic;* and the third, the *synthetic.* The first is preparatory; the second constitutes the bulk of the study; the third is the scientific and final stage of perfected knowledge.

"It is obvious that in each of the three stages, the powers of the mind that are called into prominent action are not the same. The simple power of perception thru the senses, predominates in the first; the analytical understanding in the second; the power of generalization in the third. This successive predominance being precisely the same which obtains in the successive phases of development of the mind during the period of education, in the beginning, middle and end, the mode of presenting the subject must be considerably modified at each of these steps in accordance with these invariable laws." Guyot recognized that each school grade required a separate course of study, embodying these laws.

When the Academy of Neuchatel in Switzerland was put on a university basis in 1839, Guyot was appointed Professor of Physical Geography and Universal History. It was here that Guyot was able to put his theories of geographic teaching into large-scale operation. Field work was stressed. With one of his students he made hundreds of depth and temperature observations in Lake Morat and Lake Neuchatel. From these observations he made bathymetric maps of the lake basins. He conducted an investigation of the erratic phenomena in the Alps in cooperation with Louis Agassiz who shared his home in Neuchatel from 1844 to 1848. His studies of the glaciers of the Aar, Rhone, Gries, la Brenva, etc., have been duly acclaimed by Agassiz.[4] He had organized a uniform system of weather observations thruout Switzerland, established new stations in critical areas, and ordered improved instruments to be

[4] L. Agassiz, *Nouvelles Études et Expériences sur les Glaciers Actuels, leur structure, leur progression, et leur action physique sur le sol,* Masson, Victor, Paris, 1847, pp. 207-9, 238-9. Also see his *Geological Sketches,* James R. Osgood, Boston, 1876, pp. 14-18.

installed in all stations. A complete list of the scientific papers describing his work during this period has been prepared by Faure.[5]

EARLY WORK ON THE UNITED STATES

In March, 1848, the Swiss revolution against Prussian rule in Neuchatel closed the Academy. In the next few months Guyot received several offers of teaching positions, including one from the citizens of Neuchatel to remain there and reopen the Academy. Agassiz, however, urged him to move to the United States to spread the geographic theories and teaching methods of Ritter and von Humboldt. It was well known that geography, as taught in the schools of the United States at that time, was dry, unsuggestive, immethodical and uninteresting.[6] Guyot was challenged to leave Switzerland, altho he was 41 years old at this time and was the sole support of his mother, two sisters, and a nephew.

One of the first places Guyot visited after he arrived in New York in September, 1848, was the Appalachian mountain area in Western Pennsylvania. He became fascinated with this wild area and continued to visit the various parts of the Appalachians each summer as long as he lived. He found that some of the highest peaks were not shown on the existing maps, and other peaks listed as the highest were so inaccurately measured as to cast grave doubts on the validity of all elevations shown on these maps. Realizing that accurate topographic maps are essential to field work in physical geography, Guyot assigned himself the task of furnishing the data for such maps. He had previously taken thousands of measurements in the Alps as a part of his mapping of the location of glacial erratics, and had developed a system of barometric observations which, altho laborious, resulted in highly accurate elevation data. When he was teaching at Princeton he took a few of his students to the mountains each summer to assist in his hypsometric investigations. These trips gradually became training sessions, and while large areas of virgin territory were mapped each year, the real purpose seems to have been a drill in precise field study techniques for his students rather than an attempt to

[5] Charles Faure, "Notice sur Arnold Guyot (1807-1884)," *Globe*, Vol. 23, 1884, pp. 1-72. Also see Louis Favre, "Arnold Guyot 1807-1884," *Musée Neuchâtelois*, Neuchâtel, Imprimerie de la Societe typographique, (Jan., Feb., and Mar., 1885), pp. 4-7, 33-41, 65-75.

[6] "Arnold Guyot," *Science*, Vol. III, No. 55, (February, 1884), pp. 218-9.

solve all of the mysteries of nature. Later investigators could profit from this pioneer work in their use of maps prepared from Guyot's data for geomorphic studies. His measurements were considered sufficiently accurate to be used in the compilation of maps of the Appalachian Mountains for the Union armies in the Civil War.[7]

Guyot was first employed in this country by the Massachusetts Board of Education, to conduct teacher's institutes, and to lecture to the State Normal Schools on the improvement in methods of teaching geography. The institutes were organized on a town basis, and they invited speakers from the State list. Guyot was a popular choice. Each year from 1849 to 1855 he spoke to from 1500 to 1800 teachers.[8] At these meetings the lack of good texts, maps, and manuals for teachers, was mentioned again and again. Guyot was asked to provide the types of materials that he described in his lectures because they were not then available in the United States. The preparation of these materials could not be started immediately because of commitments to the Smithsonian Institution and the Regents of the University of the State of New York to establish a workable network of weather stations in New York and to modernize instrumentation in all of the stations in the state. In the winter of 1850 Guyot established 50 new weather stations in New York modeled after those that he had established in Switzerland 11 years earlier. He also compiled physical tables to enable observers to quickly compute related data and means from observed values. These tables are still being used by climatologists. As soon as financial backing had been secured in 1854 for his Professorship of Physical Geography and Geology at the College of New Jersey in Princeton, Guyot made a detailed outline of data to be included in his series of maps and textbooks.

In Guyot's plan for classroom studies the wall-map was established as the starting point and the basis of all geographic instruction. He believed that map study should precede book study, and a geography textbook without maps was of little use. He frowned on the use of ornate maps for illustrative purposes in books, because in his plan the map should be the subject of the text and the

[7] William Libbey, Jr., "The Life and Scientific Work of Arnold Guyot, Corresponding Member, American Geographical Society," *Journal of the American Geographical Society of New York*, Vol. XVI, 1884, pp. 194-222.

[8] L. C. Jones, "Arnold Henri Guyot et Princeton," *Quartorzieme Fascicule de la Faculte des Lattres*, Neuchâtel, Université de N., 1929. Also see his "Arnold Henry Guyot," *Bulletin XXIII*, No. 2, Union College, Schenectady, (Jan., 1930), pp. 31-65.

focus of the whole study. Consequently, his first production was a *Mural Wall Atlas of Physical Geography,*[9] which was published in 1856. The maps in this atlas showed the major mountain ranges on each continent, rivers, elevation profiles across the continents and ocean currents. In 1862 Guyot had sets of map drawing cards printed on the same projection as the wall-atlas which could be used at the student's desk to stimulate the understanding of the shape and configuration of the continents by providing exercises in map construction and coloring.[10] With these aids, grade school pupils could not only draw creditable outline maps at their desks or on the blackboard, but could also comprehend the areal distribution of the major landforms and natural regions. The wall atlas was revised in 1865.[11] In this edition the maps were refined and the technique of presentation was improved by the use of hachuring instead of banded shading to show relief. Also, green was used for lowland areas, instead of the orange color used in the earlier series, tan and brown were used to indicate plateau and mountain areas, and political boundaries were printed in red. One series of this atlas was printed on $2' \times 2'$ cards, and another $8' \times 5'$ for wall display. In 1866 Guyot prepared a set of Classical maps of Greece, Italy, and the Roman Empire for use in history classes.

SERIES OF TEXTS

The *Guyot Geographical Series* of graded textbooks revolutionized the approach to the study of elementary geography in the United States.[12] Comparison of this series with texts that were published before 1865 and those that appeared later shows Guyot's widespread influence in this field. His *Introduction to the Study of Geography* (1866) was a reader in which the student was first made aware of the geographic facts in his own neighborhood, and, by means of imaginary trips to surrounding areas, the relationship of these facts to the larger region was pointed out. His more advanced *Geographical Reader and Primer* (1882) also included stories of journeys around the world. In both the *Intermediate Geography* (1867) and *Common School Geography* (1867), Guyot

[9] Also published as *Guyot's Mural Atlas, adapted to Guyot's Courses of Physical Geography,* scale: 1 inch equals 100 geographic miles, Boston, Gould & Lincoln, 1856.

[10] *Guyot's Map Drawing Cards,* Charles Scribner & Co., N.Y., 1862.

[11] *Guyot's Physical and Political Wall Maps,* Charles Scribner & Co. N.Y., 1866.

[12] W. B. Scott, "Arnold Henry Guyot," *The Popular Science Monthly,* Vol. XXV, 1884, p. 263.

stressed the forms of continents with exercises in map drawing. Additional geographical principles are added in the texts for each higher grade. The most advanced text in Guyot's series is the *Physical Geography* (1873) which contains the complete statement of his method of geographic study.[13] While he had an excellent command of the English language, Guyot's style of writing was formal, and his habitual use of technical terms made the understanding of his text difficult for children. Realizing the disadvantage that his scientific geographies would contain for their users, Guyot asked Mrs. Mary Howe Smith, teacher of geography in the Normal and Training School at Oswego, New York, to reword his texts for better understanding at each of the various grammar school levels.

This geography series had wide acceptance. Guyot prepared special state supplements describing the geography in Vermont, Massachusetts, New York, Ohio, Indiana, Illinois, Michigan, and later for the New England States and the East Central States to be used with his *Elementary Geography for Primary Classes* (1868) in those states. This text was also translated into the Dakota language.[14]

Travel and Research

In addition to his writing and teaching, Guyot availed himself of every opportunity to travel. As soon as the transcontinental railroad was completed in May, 1869, Guyot made arrangements to visit the mountain areas of Western United States. Eighteen months later he was taking barometric observations in the mountains of California. During this trip he laid the foundation for the First Princeton Transcontinental Excursion. These excursions became an annual highlight of scientific study at Princeton, and the collections of fossils, minerals, artifacts, etc., which were brought back quickly filled the museum established by Guyot at Princeton for his European glacial erratic fragment collections.

As stated in *Science*, "He avoided the snare of routine which entraps so many of the college professors of this country; but, by always proposing to himself new lines of inquiry and new subjects

[13] This series also included a *Grammar School Geography*, Scribner, Armstrong & Co., N.Y., 1874, which I have not seen.

[14] *Maka-oyakapi*, Scribner, Armstrong & Co., N.Y., 1876 (translated by S. R. Riggs and A. L. Riggs). Portions of this translation appeared as: *Makoce wowapi wakan kin en cajeyatapi kin*, Scribner, Armstrong & Co., N.Y., 1876.

of investigation, he kept his mind perpetually fresh, so that, until the infirmities of old age attacked him, he was younger than many of his juniors."[15] Guyot was active in several areas of research in physical geography. This work has been aptly described by outstanding men in their fields. For example, Dana[16] and Scott[17] have explained his contributions to geomorphology, Jones[18] gives a detailed treatment of his work in hpysometry, Libbey[19] tells of his meteorological investigations, Davis[20] gives him credit for pointing out the need for "causal relationships," and Avery and Fink[21] cite his work in mountain exploration. A full evaluation of Guyot's contributions would require an analysis of all of the numerous speeches, articles, maps and books which he prepared. Unfortunately, many of his reports on geographic research have not been found. It was his habit to speak extemporaneously from notes, even at national scientific meetings, and he usually did not deposit a manuscript for publication unless he was specifically asked to do so. Until the complete story can be developed, Guyot's greatest influence in American geography must be stated in terms of the hundreds of students which he instructed, many of whom became teachers and passed on the geographic knowledge which he introduced to this country.

[15] *Science*, Op. Cit.

[16] James D. Dana, "Memoir of Arnold Guyot, 1807-1884," *Biographical Memoirs of the National Academy of Science*, The National Academy of Sciences, Washington, D.C., Vol. 2, 1886, pp. 309-347.

[17] W. B. Scott, Op. Cit.

[18] L. C. Jones, Op. Cit.

[19] William Libbey, Jr., Op. Cit.

[20] William Morris Davis, "The Progress of Geography in the United States," *Annals of the Association of American Geographers*, Published by the Association, Nashville, Vol. 14, 1924, pp. 159-215.

[21] M. H. Avery, and P. M. Fink, "Arnold Guyot's Explorations in the Great Smokies," *Appalachia*, The Appalachian Mountain Club, Boston, New Series, Vol. 2, (Dec., 1936,) pp. 253-61. Also see: "The Nomenclature of the Great Smoky Mountains," *The East Tennessee Historical Society Publication No. 9*, The East Tennessee Historical Society, Knoxville, 1937, pp. 53-64.

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GEOGRAPHY AT THE UNITED STATES AIR FORCE ACADEMY

ROBERT T. RAMSAUR
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United States Air Force Academy

The United States Air Force Academy is a new institution which began operation in July, 1955. It is neither an engineering nor a liberal arts college, but combines both so as to produce a general education which endeavors to impart to each cadet, "the knowledge and qualities of leadership required of an officer in the United States Air Force, and a basis for continued development thruout a lifetime of service to his country." Thus the Air Force Academy is an institution devoted to providing the broad educational program required by future air commanders.

An essential foundation for the general education of the future air commander is the study of geography. Geography plays an important role in developing the cadet's relational thinking and serves as a meaningful integrator of the entire curriculum. This becomes apparent when the objectives of Geography 101 are examined. According to the study guide provided for each cadet, the objective of the course is, "to enable [the cadet] to understand reasons for progress in some areas of the world and lack of progress in others and to enable [the cadet] to evaluate present and future influences of geography on air power and national security." Implicit in these objectives is the study of physical, cultural, economic, and demographic factors and their areal and national groupings, so as to provide an understanding of these major areal differences and the interrelationships among them. Inherent in these course objectives are an appreciation of those geographic factors which add to or detract from a nation's power and an understanding of the importance of geography in the application of airpower.

THE GEOGRAPHY COURSE

The geography course at the Air Force Academy is a three semester hour (50 classroom hours) course taught in the fourth class (freshman) year. Content-wise, the first two-thirds of the course is devoted to a systematic study of the physical and cultural elements of the human habitat. The last one-third of the course is concerned with the regional analysis and power evaluation of selected

areas, with emphasis on geographic factors affecting air power and national security. What has emerged is a systematic approach thru three interrelated blocs of instruction.

The first phase of the course is devoted to analyzing and emphasizing the importance of the physical basis of the human environment. This physical base covers weather and climate, natural vegetation and animal life, soils, landforms, water, and mineral resources. The first three hours of this bloc are also designed as an introduction to familiarize the cadet with the study of geography and to laying out the framework of reference for further study.

The second part of the course stresses the interrelationship between man's physical environment and man's activities. The primary objective of this bloc is to show how man's economies, transportation, communication, settlement patterns, numbers, and distribution are related to a physical base. The first few lessons of the bloc introduce the cadet to mineral resources, the significance of mineral raw materials to a nation's welfare, and some of the problems associated with the extraction and utilization of mineral raw materials. The cadet's study of mineral resources serves as a bridge to focus his attention on the interrelationship between the physical resource base and man's activities. The remainder of the bloc deals primarily with such major activities of man as manufacturing, agriculture, trade and commerce, his patterns of settlement, and his numbers and distribution on a world wide basis. Each activity is examined from the standpoint of its distribution thruout the world, the geographic principles influencing its distribution, and the significance of such activity to a nation's welfare and power.

The last part of the course is the capstone to the cadet's study of geography because, in this final bloc, all of his previous systematic study of geography is focussed on analyzing selected key world areas. In this bloc, he becomes familiar with different ways of evaluating the power of a nation. By means of written reports and seminar presentations he geographically analyzes and evaluates selected areas. Not only is the cadet's knowledge of geography brought to bear in his geographic analysis and evaluation but subject matter from such fields as history, economics, and international relations are incorporated into his evaluation. It is in this section of the course that the dynamic nature of geography be-

comes apparent and provides the key for the understanding of progress in some parts of the world and lack of progress in others. In addition, this section of the course is concerned with relating the importance of geography to air power (a continuing objective thruout the course) and especially is it concerned with providing the cadet with a framework of geographic thought which will be of use to him thruout a lifetime of service to his country. In summary, this bloc has Air Age flavor and is concerned with such topics as expanding world regionalism, power evaluation, geopolitics and political geography, and regional analysis.

Techniques

Some of the techniques utilized in teaching the course may be of interest to geographers. Some are tried and true civilian college techniques, others are possible because of the inherent nature of a service academy, and still others have been improvised as the need has arisen. Some of the representative techniques utilized are:

1. Provision of a student study guide for each cadet which includes objectives and key points, discussion questions, map exercises, and suggested collateral readings for each assignment.
2. Integration of instruction with other courses taught at the Air Force Academy serving to remind the cadet of the correlative nature of geography.
3. Oral reports and a short term paper, which encourage thoughtful factual interpretation and give practice in oral presentation and self expression.
4. Frequent short examinations which provide the instructor with a check of progress being made and allow the student to evaluate his own progress.
5. Emphasis on essay questions designed to stimulate originality and analysis rather than rote memory.
6. Classroom discussion in small section meetings in which the emphasis is not on instructor erudition but on testing cadet ideas thru class participation.
7. Joint seminars with faculty members who teach related courses which the cadets will take in following years. So far two have been pursued with marked success: the first, "Expanding World Regionalism" held in conjunction with the Department of History; and the second, "A Colloquium on Political Geography and Geopolitics" with the Department of Military History.

8. The development and utilization of various audio-visual techniques and training aids to add greater realism to the instructional mission and serve as substitutes for field work, which, owing to the closely regulated schedule, is impossible at the Air Force Academy.

There are certain inherent advantages in the nature, mission, and organization of the Air Force Academy which make very rapid instructional progress possible. Among the advantages which may be listed are:

1. A prescribed curriculum. With all cadets taking the same courses, the instructor is relieved of much of the problem of reconciling divergent academic courses and levels of accomplishment.

2. Small (12 cadets) discussion classes. Realizing, however, that individual differences do exist, cadets are sectioned according to academic grades to take care of the individual differences.

3. A highly selected student body capable of covering difficult material very rapidly; and

4. Reinforcement in our teaching mission from other departments. The Department of Graphics has the mission of teaching the cadet to read, understand, and use intelligently aerial photographs, topographic maps, and aeronautical charts, including map projections, position referencing systems, photo interpretation and stereoscopy. The Departments of Physics and Flying Training teach weather and climate including the physical characteristics of the atmosphere and their effects on the flier. Much of the material presented by the Departments of History and International Relations as well as that of other departments is also closely related to and reinforces the teaching of geography.

In summary, the primary problem of geography at the Air Force Academy is the problem of condensing into a three semester hour course all the formal geography that a cadet will study in his four years at the Academy. However, if it is kept in mind that our orientation is that the study of geography is not concerned so much with covering an exclusive field of knowledge, as it is with promulgating a way of thinking, the problem is not insurmountable. It is fortunate that a broad scientific-humanistic-social science education, which is one of the prime objectives in the education of a trained geographer, is also the objective of the cadet's four years of study at the Air Force Academy. Our problem is not that of turning out trained geographers but of turning out well educated

Air Force officer citizens. If this aim is kept in mind, our primary objective then, is training the cadet in geographic thinking, not in mastery of the whole field of geography, thus providing the future air commander with a foundation for his next four years of study and a lifetime of service to his country.

DAILY WEATHER MAPS AS ILLUSTRATIONS OF WEATHER TYPES: PART ONE*

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Within the last 15 years climatologists have grown increasingly aware of the significance of the circulation of the air at middle and high levels to the patterns of surface weather phenomena.

The first awareness of the existence of the Jet Stream during the early 1940's opened the door to many discoveries of the relation of upper air phenomena to surface expression.

It is the purpose of this paper to point out a limited number of such relationships which are clearly demonstrable on the United States Government's *Daily Weather Map*. On the *Daily Weather Map* an upper air chart, titled the "500 Millibar Constant Pressure Chart" shows, by means of contour lines, the height in feet of the pressure level surface for 500 millibars of air pressure, determined by radiosonde observations. Air circulation is most active where these contour lines are closest together; hence the Jet Stream is easily identified by noting those areas of contour line concentration.

Jet Stream flow is most significant in concentrating middle and upper air flow; in directing the movement of surface pressure systems; in establishing areas of convergence; and, under favorable conditions, in establishing areas of precipitation.

The following weather map example will point out the more important relationships between middle and upper air Jet Stream flow and surface weather phenomena.

July, 1955 was was selected to illustrate a summer period during which prolonged upper air patterns dominated the atmosphere, and regional differences were clearly observable on *daily* weather maps as well as the *monthly* average picture. This month was char-

* A research grant from the National Council for Geographic Education enabled the writer to undertake this study.

acterized by above normal temperatures over most of the United States east of 100° W. longitude, by slightly below normal temperatures in the Gulf coast and Georgia areas, and below normal values west of the continental divide (Fig. 1).

The precipitation picture was slightly more complex: above normal falls occurred in the northwest, southwest, north central and south central portion of the country; in general less than normal falls were reported elsewhere (Fig. 2).

The following upper atmospheric conditions were the statistically well defined features of the *entire month*—

1. Jet stream flow at 500 mb. level was located near the United States-Canadian border.

2. Extensive anticyclonic development at the surface and at the 500 mb. level occurred over southeastern United States.

3. A deep trough at the 500 mb. level was located along the Pacific coast of the United States; strong northerly flow occurred west of the trough, and southwesterly flow east of the trough (that is, over northwestern United States).

4. Weak frontal waves or cyclones formed in this trough and moved from the northern Rockies eastward to the north Great Lakes.

5. Easterly wave activity, or easterly flow occurred south of the persistent surface and upper air anticyclone over southeastern United States.

The weather map for July 27, 1955 (Fig. 3) exemplifies many of the upper atmospheric circulation characteristics as well as surface weather phenomena which are to be found in the statistical averages for the entire month.

1. Strong jet flow at 500 mb. entered northwestern United States and continued inland moving northeastward over western Montana, and then continued eastward along the 54° parallel of latitude. Most of the United States was south of the jet under the domination of mT air moving northward from the Gulf of Mexico.

2. Most of the United States south of the Great Lakes and east of the 100° W. meridian of longitude lay under the influence of a surface anticyclone; aloft at 500 mb. almost all of the United States east of the continental divide was under the influence of an anticyclone. Surface temperatures under most of this area were in the nineties; a band of 100° values was found from southwestern Arizona northeastward to northern Wisconsin.

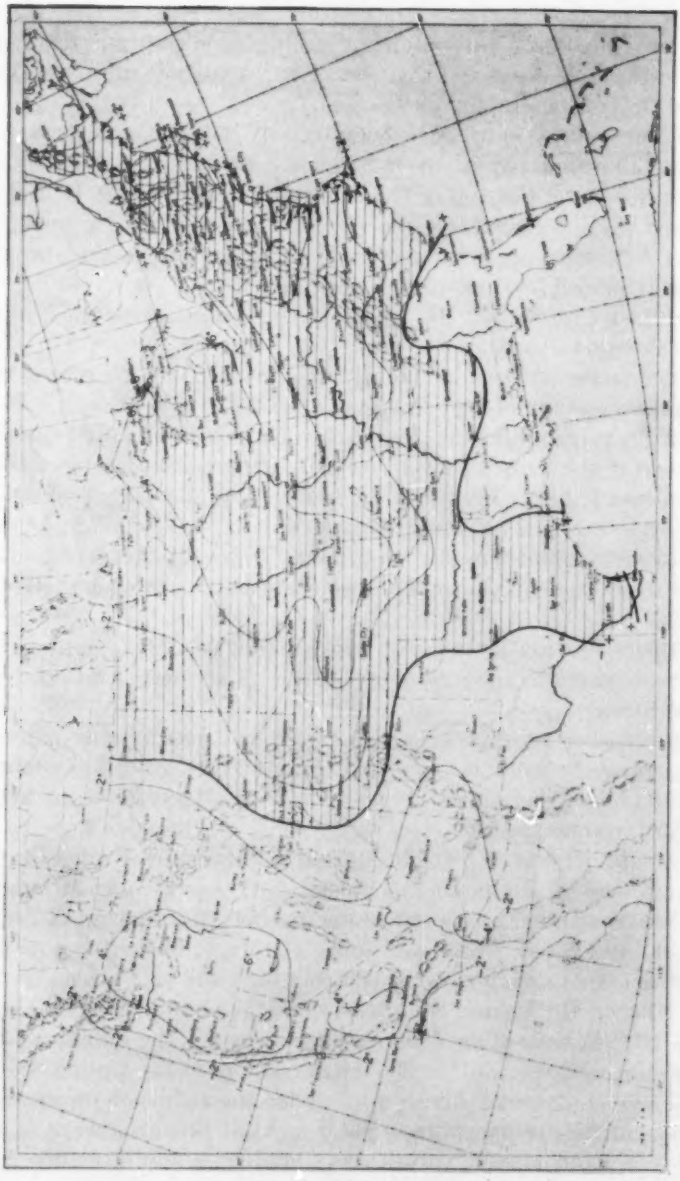

FIG. 1. Departure of Average Temperature From Normal (°F.) July, 1955.

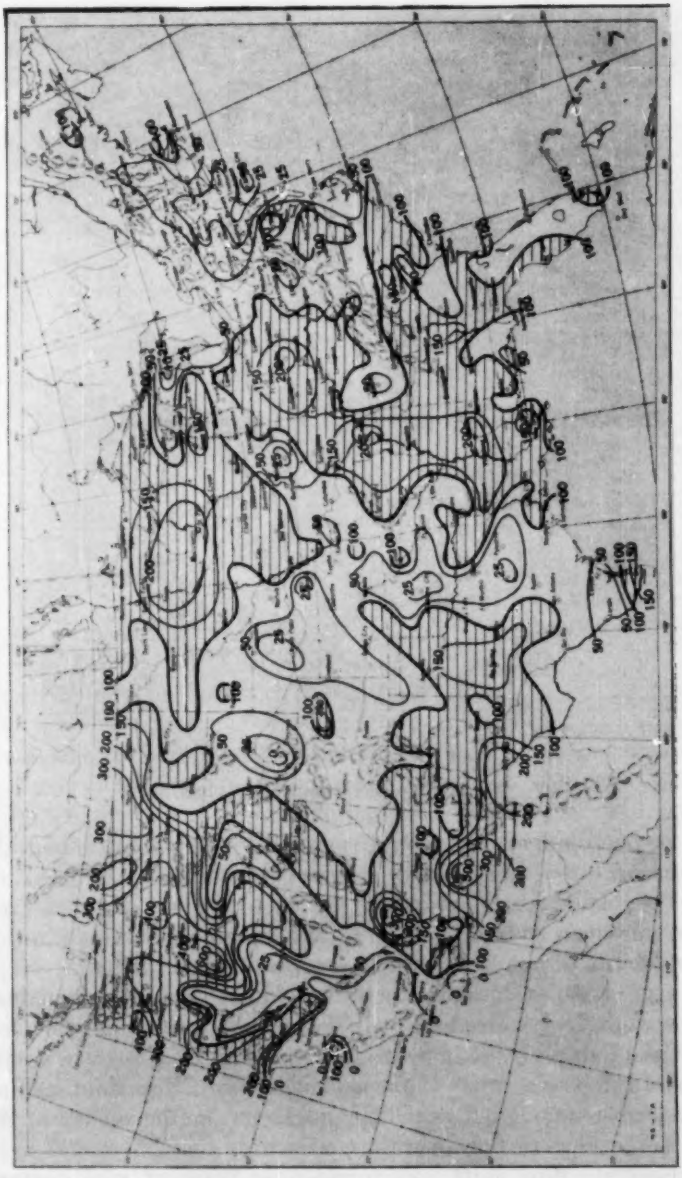

FIG. 2. Percentage of Normal Precipitation, July, 1955.

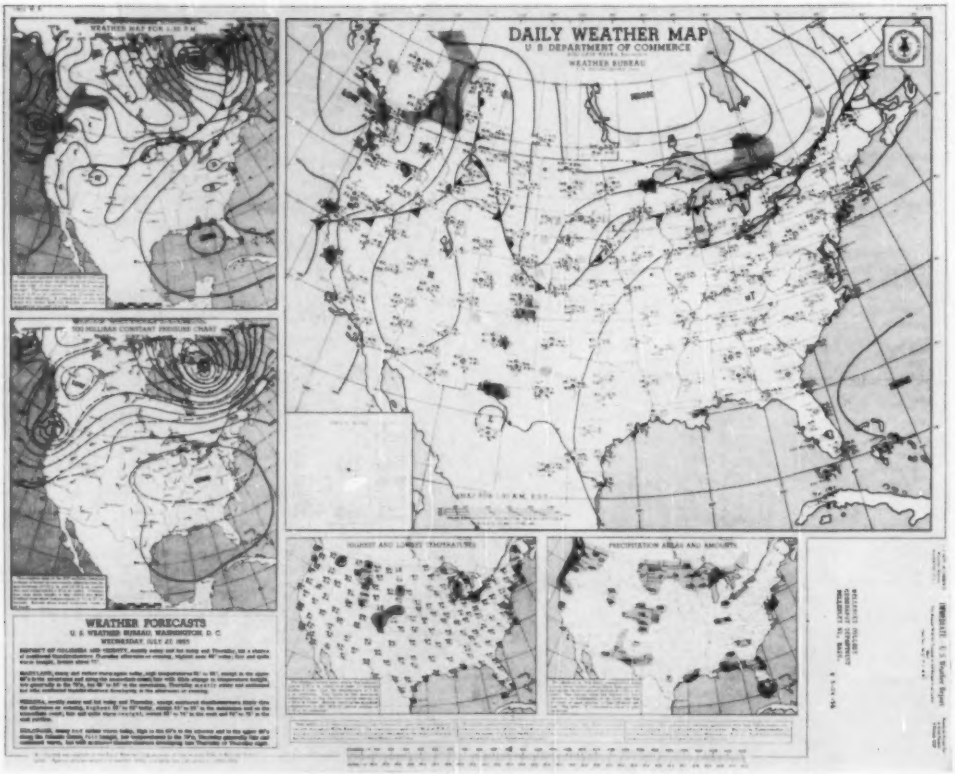

Fig. 3. Daily Weather Map, July 27, 1955.

3. A deep upper air trough extended north-south from the southern Yukon to San Francisco. Very cool temperatures persisted along the Pacific coast margin of the United States; northern California, northern Oregon, and all of Washington had precipitation ranging from .01″ at Red Bluff to 1.44″ at Tatoosh Island.

4. Two weak cyclonic centers were found along the boundary zone between very warm moist air in the United States and cooler, drier Canadian air—one in central Montana and the other in northwestern Iowa. Light rain was recorded eastward from Montana and Colorado to Upper Michigan. This marks the southern edge of the upper air Jet Stream flow over the continent.

5. Easterly flow aloft was found over much of southeastern United States. Most of the Gulf coast area had shower activity.

For further applications to the agricultural economy, reference to contemporary issues of the *Weekly Weather and Crop Bulletin,* is suggested.

Obviously an endless variety of atmospheric case studies is available to introductory physical geography. Skillful integration of the *Monthly Weather Review* with *Daily Weather Maps* can achieve greater appreciation of the role of the upper air circulation in determining surface weather expression. After some technical experience has become part of understanding, examination of the *Daily Weather Map* will be far more meaningful. Moreover, these gains last well beyond the formal educational training: as long as television, radio, and newspapers present information about the weather, meteorological concepts will be reviewed and enriched.

BEGINNING A MAP STUDY WITH MYTH

DWIGHT W. ALLEN
Hillsdale High School, San Mateo, Calif.

"I wonder how Elvis would look on a polar projection" mused one ninth grade high school student when given an exercise in comparative map projections. Another student chose to translate the imprint of the palm of his hand into a mercator-like projection. These are but two examples of the interest and enthusiasm which was generated for an introductory map exercise which dramatically demonstrated the advantages, disadvantages, and uses of some basic map projections.

The purpose of the project was to familiarize students with the advantages and drawbacks of various common map projections and to show the general problem of transcribing global characteristics on a flat surface. Students were also instructed as to how maps should be labeled, how coloring and shading makes maps more legible, and how different markings and colorings are used depending on the purpose for which the map is to be used.

The project was developed by supplying the students with outline forms which had grids approximating the various projections to be studied.[1] They were then given one grid with a mythical land

[1] Three grids were simulated: mercator, cylindrical, and polar (see accompanying figures).

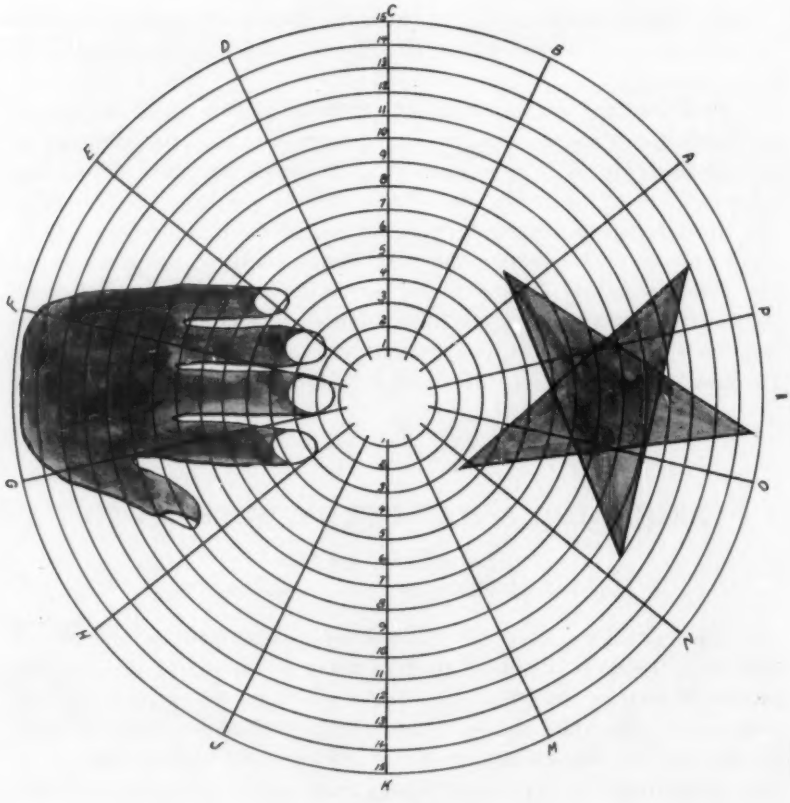

FIG. 1

mass outlined, and asked to transcribe this mass to the other grids. In the process of this transcription it became evident to the students that shading and coloring were vital tools in making a distinct and legible representation.

The next step was to give them a second mythical land mass on a different grid repeating the first assignment, but starting with a grid which had a different distortion. The final phase of the project was for the students to outline any land mass of their choosing and then transcribe it to the other two grids.

Figures 1, 2, and 3 show the results of transcribing a mythical mass (in this case a hand and a star) from the polar grid (Fig. 1) to the cylindrical and mercator outlines (Fig. 2 and 3). These

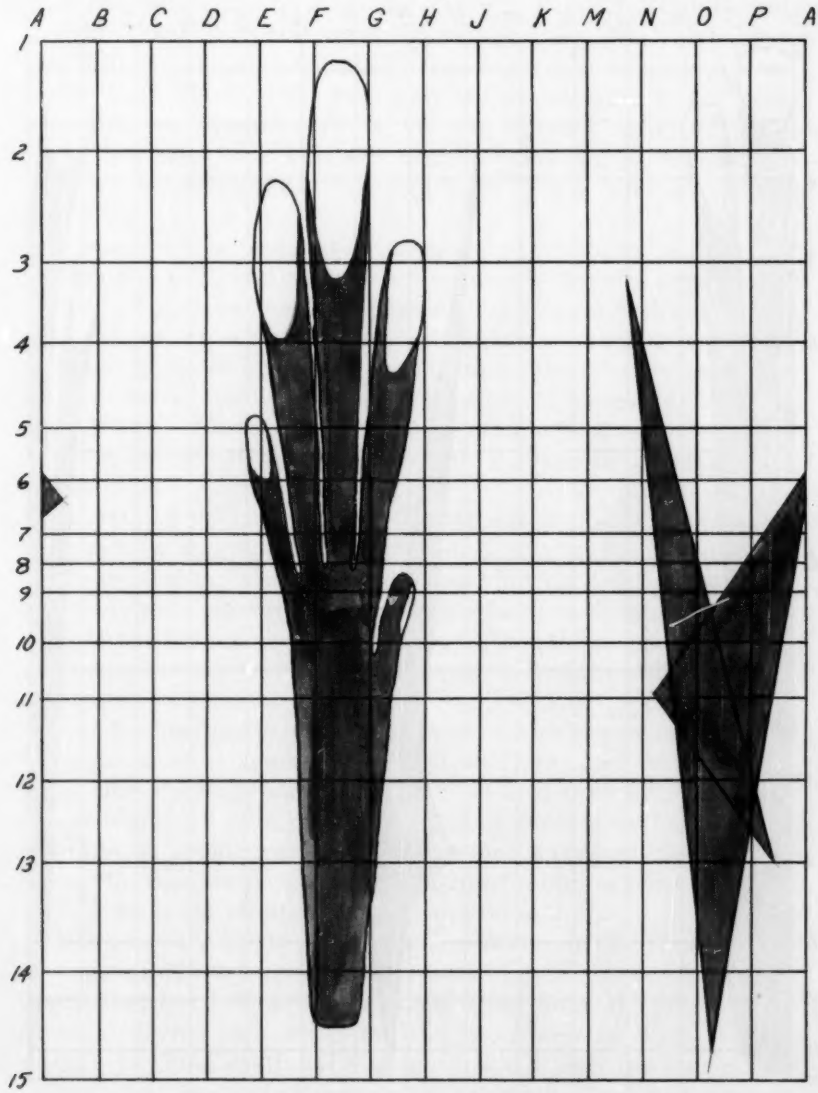

FIG. 2

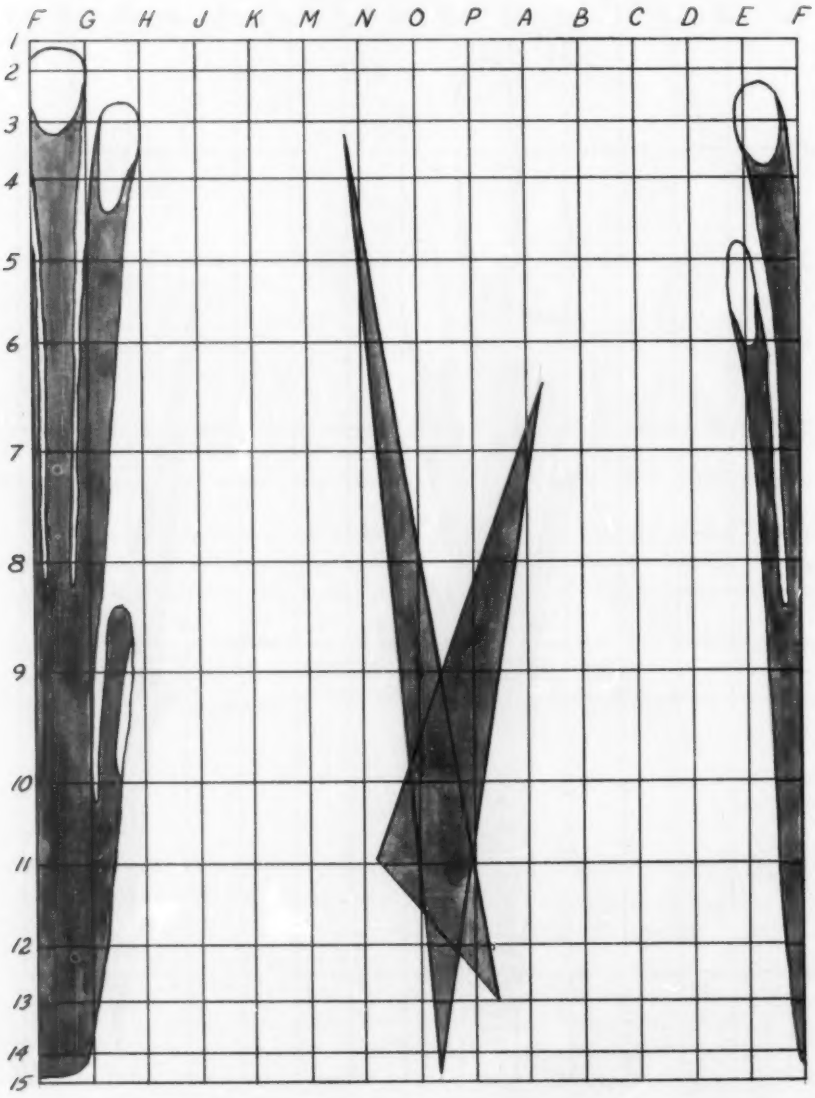

FIG. 3

drawings were made by John Robertson, a Hillsdale High School student. The distortion is very obvious, but it might be pointed out how different the distortion is in the "fingernail" areas as an example. Note also that the two grids are discontinued at different places. Figure 2 begins with "A" whereas Figure 3 begins with "F" at the left hand side. This was done to point out the difficulty in selecting an appropriate "breaking point" for a rectangular grid of any type.

The necessary preparation consisted of arranging for the reproduction of the outline grids (fluid process masters were used), and after a sufficient number of these outlines were made, using the same master set to fill in the desired land mass to be copied for the first part of the exercise. The accompanying figures show the grids and dimensions used. Actual size was 8.5 by 11 inches. It should be noted that no effort was made to approximate the true scale of any of the grids, the outlines simply indicate the type of distortion each engenders.

About one week was allowed for the completion of the project, and tho there was no set class time scheduled after the introduction of the general topic of map projections which lasted for two days, questions were answered at the beginning of each class hour and some of the work of the students who finished the assignment early was passed around the class for inspection—which tended to generate more enthusiasm.

For the final phase of the project the students were encouraged to use as much imagination as they could—the fact that they enjoyed this challenge and opportunity is evidenced by Elvis (the letters E-L-V-I-S were spelled out) and the palm of the hand (illustrated here) among many others. The fact that these land masses bore little relation to actual geographical contours in no way detracted from the effectiveness of the exercise.

The results were almost spectacular. Almost all the students did an enthusiastic and more than adequate job. They indicated that they had enjoyed the project and since that time (the project was assigned during the second week of the course in World Geography) they have continued to demonstrate in class discussion and on tests that the project contributed substantially to their understanding of map projection differences.

THE GEORAMA—AN AID IN GEOGRAPHICAL MOTIVATION

DANIEL JACOBSON
Montclair State College, Upper Montclair, New Jersey

George T. Renner pointed out that geography ". . . is one of the most difficult things in the educative process to teach."[1] He would agree that for pupils it is one of the most difficult of the disciplines to learn. One facet of the difficulty, for teacher and pupil alike, involves the problem of transcending limited experiences with the earth. How many of us, for example, have scaled the high Andean peaks, have waded knee-deep in water in the rice paddies of Thailand, have slept in the tent of the Bedouin of the desert? How many of us have seen the wheat fields of Kansas, the ore boats at Duluth, the Statute of Liberty? How many children are encompassed by a world whose frame extends less than 50 miles in any given direction from the school's doors?

Educational psychologists have pointed out, that to do our job and do it well, we must learn to cultivate the child's imagination, we must teach an understanding of important causal relations, we must teach the correct interpretation of pictures, maps and presumably of globes.[2] These are all aids in transcending the student's limited earth experiences.

How well this can be done at an early age was recently demonstrated by the teachers and pupils of Sen. Robert F. Wagner Junior High School, New York City, in their fine exhibit, "Georama—Geography in the Global Age." After taking 10 weeks to produce the exhibit, it was on display for a month.

A visit to the exhibition was one to delight the teacher. Student guides were eager to explain the dioramas, the models, and the work that went into the exhibit. Youngsters gazed in awe at the giant six-foot relief globe in the center of the room[3] and the full-scale model of the earth satellite.[4] Interested children, having al-

[1] George T. Renner, "Education in a Geographic World," *Better Understanding and Use of Maps Globes Charts*, Denoyer-Geppert Co., Chicago, p. 2.

[2] Charles H. Judd, *Educational Psychology*, Houghton Mifflin Co., Boston, 1939, p. 335.

[3] Loaned to "Georama" by Geo-Physical Maps, Inc.

[4] Loaned to "Georama" by the National Science Foundation.

ready learned to use new terms—seismology, oceanography, International Geophysical Year—in class, were applying them in the Georama. One lad was fascinated by the diorama entitled "How the Mongolians Made Camp," another by "the Face of the Earth as Seen from the Air," and a young lady was admiring "Architecture Around the World." Maps were everywhere. Among these was one showing the contour and its significance. Others showed the importance of location to Manhattan Island, the distribution of natural rubber around the earth, and trouble spots in the Carribean. Also included in the exhibit were at least 30 small globes, each used to depict a significant geographic distribution or concept—such as the distribution of the world's glacier fields, earthquake areas, member stations of the I.G.Y., the winds and currents, the routes followed by the great explorers, and the world's major religions.

Nothing was done haphazardly. All displays were arranged in orderly sequence. Observers were taken first thru "The World We Know" where emphasis was placed on maps, map reading, painted globes and the study of the natural environment, next thru "The World We Don't Know" which stressed glaciology, oceanography, the upper atmosphere, the significance of the I.G.Y. and the polar regions, and finally thru the "Special Exhibits" featuring the giant globe, the model of the earth satellite, cosmic rays, the operation of rocket fuels and the problems of outer space.

Mr. Charles M. Shapp, Principal at Wagner, pointed out that Georama was not a motivating force for the study of world geography alone. "It started," he said, "as a 9th grade social study activity within the curriculum framework and mushroomed by student enthusiasm to encompass virtually all classes including science, literature and art."

When asked which of the tools was most useful to them during the course of the exhibit students invariably replied, "The small globe." Its possibilities for the educative process intrigued me from the start.

We are all aware of the place that the globe holds in geographic education. We all know, too, that the ordinary multiprinted globe suffers from one serious limitation. It does not convey to the child the true picture of the earth's land surface. Mountains, river valleys, spacious canyons and other topographical forms have been reduced to a single dimension—to the smooth surface. And from this smooth representation of the earth the student has been ex-

pected to grasp what the earth's surface is really like—to discover the fundamental relationships between topography and weather and climate, the influence of terrain on historic migration routes, on land utilization, on trade. All too often these are mental leaps too difficult for the youngster in the grades to bridge. It is asking the smooth surface globe to perform a task which it is incapable of performing.

The 12 inch relief globe which really sparked the Georama, has bridged that gap.[5] It is a white unmarked project globe that portrays the world land surface in three-dimensional relief.[6] Made of plastic in two hemispheres to permit "team" work, it is designed for the student to paint his study on the surface with poster colors, and because it is washable, they paint without fear of making irreparable errors. The excitement of the children as they become aware of the significance of the earth's relief features in their study is a rewarding one to observe. This is true experiential learning (Fig. 1).

Student reactions to Georama were recorded in essays written soon after the exhibit closed. Mason Bernard, 8th grader, states, "Georama is a wonderful example of what we (junior high school students) can do." Mason helped to prepare the diorama "The Earth as Seen from the Air." "It was made of cardboard, rags, and plaster of paris. I also helped by painting some of the globes. Most of the kids in my class helped with something." Richard Weisberg, 9th grader, states, the Georama ". . . has helped many parents, teachers, students and guests to learn about how man lives all over the earth. The colorful way in which it was done added to its effectiveness and its beauty. The task of making the exhibits, the excitement of the display, the publicity, and the originality of the georama made it a huge and wonderful success." Sofa Khalidi, 8th grader, was impressed with the fact that ". . . it helps the teachers too, it helps to get them more involved with their pupils and to know them better." Perhaps the most profound statement comes from Dennis Miller, 9th grader, "This Georama has made a deep impression on me. I am taking a more serious interest in geography and science."

Mr. Shapp is convinced as a result of Georama that there is a latent, unsatisfied interest among students in the world in which

[5] The Geo-Physical Relief Work Globe.

[6] William A. Briesemeister, "Some Three-Dimensional Relief Globes, Past and Present," *Geographical Review*, Vol. XLVII, No. 2, April, 1957, p. 260.

FIG. 1

they live, that given the proper tools students can be urged to extend their capabilities deeper into the subject of geography than had previously been suspected. The Principal was assured by participating teachers that all courses of study had been immeasurably enriched.

Mr. Shapp added that three things had been learned as a result of Georama: 1) that students are tremendously excited with the study of geography when it is made visually concrete, 2) a clearer understanding of the geographic base enriches the history, current events and science courses, 3) that such an undertaking stimulates teachers to experiment with and perfect interesting new techniques in teaching.

For my own part, I am convinced that Georama at the Robert Wagner Junior High School pointed to a new means of orientation for educators in supplying what may well be an answer to the search for concrete methods to introduce world understanding in the curriculum. I am convinced that similar studies at the elementary level would demonstrate even more dramatically the readi-

ness level of the "television age" child.* At the high school level I am sure it would facilitate in much greater depth the study of world geography and its allied disciplines so urgently demanded of our schools today.

* Editor's Note: Have you read *Geography Via Television* by Jewell Phelps, the first booklet of the Do It This Way Series? It is now available for distribution. The booklet sells for $1.00 a copy. Write to Professor John W. Morris, Secretary of the National Council for Geographic Education, Department of Geography, University of Oklahoma, Norman.

QUESTION AND ANSWER BOARD PROMOTES EFFECTIVE GEOGRAPHIC CONCEPT-BUILDING

Katherine Cook and Edward M. Vodicka
Pease School, Austin, Texas

Effective learning of geographic facts has been found to be stimulated by the use of a "Question and Answer Board" in a sixth-grade classroom at Pease Elementary School, Austin, Texas (Fig. 1). Planned and designed cooperatively by the pupils and their teacher, the board is designed to enable pupils to manipulate and explore combinations of correct answers to questions about geography, history, science, and other content areas in a most interesting and unique manner.

Here is how the board works: a series of 18 questions are devised and the 18 answers that correspond to them are found. The questions are written with a brush pen or a giant-sized black crayola so that they may be read from all parts of the classroom. One question is taped (Scotch tape or masking tape may be used) on each square on either the right half or the left half of the board. The answers are written on slips of paper and taped to the opposite side of the board from the questions. One must be sure that the answer to each question is placed in the square which is wired to the question it answers. When the lead wires (one for questions and one for answers) are brought in contact with the metal brads in the squares, a bell, powered by a dry-cell battery, will ring, thus indicating that the correct answer was given.

The "Question and Answer Board" is particularly valuable when used to introduce a new unit of work. For example, in a unit

FIG. 1

on geography each member of the class would submit from three to five questions on the subject. Then the 18 questions deemed most pertinent and suitable for use on the board could be determined, with the pupils themselves supplying the answers thru research and reference-type activities. Questions that were not selected for use on the board could be mimeographed and made the basis of supplemental pupil research. In like manner, a unit on plants could be introduced by the use of the board. For example, a teacher might use leaves from local trees as the "question" to be matched with the names of the trees to which they belong.

In the culmination of a unit, the "Question and Answer Board" can be used to review, evaluate, and strengthen facts learned. A favorite activity of upper-grade children—one which could be employed in Tulsa or St. Louis or Pittsburg—is the matching of states or countries with their capitals.

This device may be used in primary classes as well as the upper-elementary levels. Wherever used, it appears to enlarge the children's interest in their unit of work and heighten the effects of teacher motivation of pupil learning in a satisfying way that makes use of children's innate curiosity of the world about them.

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Dr. John W. Morris, Secretary of NCGE, gave the principal talk at the East Lakes Division of the Association of American Geographers on October 10. His topic dealt with the improvement of Geography in the public schools and the improvement in relationships between Geographers and professional educators. We can look forward to reading it in a future issue of the JOURNAL.

A new book for instructors offering courses to present and prospective teachers of geography

THE UNITED STATES AND THE WORLD TODAY

Edited by Clyde F. Kohn, State University of Iowa

This compact little book appraises the geographic factors in international relations. In particular, it summarizes the economic, political, and social relations between the United States and other major world areas since 1945. It then demonstrates how the teaching of geography in the school program can develop a better understanding of these relations.

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January 1958 · 5¼ x 8 inches · 256 pages · $3.50 list, paper

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GEOGRAPHICAL PUBLICATIONS

John C. Caldwell. **Let's Visit Southeast Asia: Hong Kong to Malaya.** The John Day Company, 62 West 45th Street, New York 36, New York. 96 pages with illustrations. $2.95.

This book treats Thailand, Laos, and Cambodia as a group of Buddhist nations in Southeast Asia among the other political units. Burma, a fourth Buddhist country has been omitted. After briefly describing the location of these countries on a map (the map is 43 pages away and no reference is made to it), the author starts his presentation of Thailand. After devoting two paragraphs to the location and area, he introduces history. To this he gives seven pages (17 paragraphs and four pictures) and then introduces geography. Here the first three short paragraphs may contain misconceptions for the readers. For example, well informed persons in Thailand do not describe their country as rolling. Moreover "heavy rainfall" may be very misleading. Five months of the year, during the winter monsoon, most of the country is dry and during the wet season most of the country get about 50 inches of rain.

Thailand, Laos, and Cambodia are not only alike in that they are Buddhist countries, but they are also alike because they are in the rain shadow of a rim of mountains and suffer from a scarcity of water from rice production. They have the same wet and dry period and they are all interested in the more efficient use of the Mekong River. Much of Thailand is too hilly and mountainous for irrigation. Most of the land cannot be irrigated. And where irrigated, it is often difficult and expensive. Water is not abundant in Thailand if compared with Burma and South Vietnam. Pepper, spices, and cotton are not as important as cassava, oil seeds, sugarcane and tobacco.

In spite of geographic shortcomings, this book is a good supplementary reader for children in sixth and seventh grades. It gives a good general background in history, culture, and religion. Unfortunately, there is only a meager amount of geography and some of it is in error.

PRASERT WITAYARUT

College of Education, Bangkok, Thailand

Zoe A. Thralls. **The Teaching of Geography.** Appleton-Century-Crofts, Inc., New York, 1958. 394 pages with index. $3.75.

The appearance of this book is timely. Written by one recognized as an authority in the field of geographic education the text is an outgrowth of a long career of successful teaching of geography at all levels of instruction.

The material included in the text is presented in 11 chapters. After presenting an introductory chapter on the nature and function of geography, the author deals with various tools with which the geographer works, maps, pictures, graphs, statistics, the landscape, current events and reading materials, and shows how these may be used effectively in the teaching of geography.

Student teachers and inexperienced teachers will find the last three chapters suggestive and helpful as they deal with unit planning and functional activities; a geographic readiness program; and an excellent outline for teaching weather and climate.

At the close of each chapter there has been included a well-selected list of references and at the close of the text an index.

Teachers seeking a text for method courses will welcome the appearance of this book on *The Teaching of Geography.*

INA CULLOM ROBERTSON

State Teachers College
Valley City, North Dakota

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GEOGRAPHICAL PUBLICATION

Charles E. Lively and Jack J. Preiss. **Conservation Education in American Colleges.** The Ronald Press Company, New York, 1957, ix and 267 pages. $5.00.

This book by two professors of sociology is a scholarly work sponsored (financed) by the Conservation Foundation. Its chief objectives are 1) to present an analysis of the extent of the teaching of conservation in various type of American colleges and universities in 1953-1954; 2) to summarize the attitudes of school administrators and of the teachers of conservation towards conservation education; and 3) to suggest methods by which conservation education can be increased. These sociologists and the Foundation agree with nearly all of the hundreds of teachers of conservation who voted on the matter that the social sciences (here limited to sociology, economics, and anthropology) should take a much larger part in conservation education than they now do, which is very small. Most of the teaching of conservation in American colleges is done now by geographers or by specialists in agriculture, forestry, or soils. Receiving small but increasing attention are water and wildlife, but minerals and recreation receive little. Few teachers devote much effort to the "wiser use of human resources," which surely is a subject of vital concern to each student. Social scientists are considered better qualified as a group to consider the latter subject than are the physical scientists, biologists, foresters, and agriculturalists.

Only slightly more than half of American colleges and universities were teaching conservation in 1954; many of these schools recognize inadequacies in their program. Admiistrators of many of the colleges not teaching conservation expressed interest in doing so. The number of well-prepared teachers of conservation is inadequate. Most conservation education is now taught in "teachers" colleges for prospective elementary teachers. Agricultural colleges and universities and some large universities offer courses in various aspects of conservation mostly for students preparing to specialize in forestry or agriculture. Few college students are studying conservation as a part of their general education, altho most administrators and teachers of conservation believe that all college graduates should have had at least an excellent introductory course in conservation. Such a course would significantly assist in preparing the student for his role as a citizen.

This book is worthy of study by teachers of conservation, admiistrators, and all others who recognize the vital importance of conservation education,

STEPHEN S. VISHER

Indiana University

GEOGRAPHICAL MATERIALS RECEIVED

Kenneth R. Sealy. **The Geography of Air Transport.** Rinehart & Company, Inc., 232 Madison Avenue, New York 16, New York. 1958. 207 pages with tables, maps, bibliography, and index. $1.50.

The Plantation: A Bibliography. Social Science Section, Department of Cultural Affairs, Pan American Union, Washington, D.C. 1957. vii and 93 pages. $1.00.

Laurence M. Gould. **Antarctica in World Affairs.** Foreign Policy Association, 345 East 46th Street, New York 17, New York. 54 pages with photographs and maps. $0.35.

N. K. Sarkar. **The Demography of Ceylon.** Ceylon Government Press, Colombo. 1957. 290 pages. $2.50 including postage.

Everyday Life in Nigeria. Filmstrip. Educational Productions Limited, East Ardsley, Wakefield, Yorkshire. 1958. $5.00.

Ekblaw and Mulkerne. **Economic and Social Geography.** McGraw-Hill Book Company, 330 West 42nd Street, New York 36, New York. 1958. 415 pages with maps, illustrations, appendix, and index. $4.56.

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GEOGRAPHICAL PUBLICATION

Kenneth R. Sealy. **The Geography of Air Transport.** Hutchinson University Library, London, 1957. 207 pp. including index. $1.50.

This book is one of the excellent brief monographs in the series published by Hutchinson under the editorial supervision of Professors S. W. Wooldridge and W. G. East, University of London. Other volumes are: *The Spirit and Purpose of Geography* by Wooldridge and East, *Exploration and Discovery* by H. J. Wood, *An Introduction to Human Geography* by J. H. G. Lebon, *The Geography of Towns* by A. E. Smailes, *Railways and Geography* by A. C. O'Dell, *Ports and Harbours* by F. W. Morgan, *The Geography of the Port of London* by J. Bird, *Geography Behind Politics* by A. E. Moodie, *Maps and Their Makers* by G. R. Crone, and *The Rendering of Geographical Names* by M. Aurousseau. They are distributed in the United States by Rinehart & Co., Inc., 232 Madison Ave., New York 16, New York.

The Geography of Air Transport consists of two parts. In the shorter first part Sealy describes the role of transportation, influences of physical factors on aircraft operations, and technical-economic peculiarities of air transport compared to other types.

The second part is mainly a regional discussion with emphasis on the air transport systems of Western (non-communist) Europe and the United States. In both regions, differences in passenger traffic at air terminals reflect the number of people in the termials' parent cities as modified by: 1) kind of city (those that function mainly as retail, wholesale, financial, political, and/or recreational centers show a greater demand for air travel than cities with other dominant functions; more precisely this factor is based on the kind of people—their per capita wealth and their ocupations as determinants of demand), 2) nearness to a bigger, better-serviced air terminal within reach by ground transport ("shadow effect"—in the United States generally not more than 120 mile radius), and 3) competing ground transport (total travel time between cities nearer than 200 miles is usually less by ground transport than air; air passengers are destined chiefly for cities beyond the range of overnight rail service). Western Europe in contrast to the United States has a denser airways network, greater route mileage assigned to scheduled airlines, shorter airline flights, and in general uses smaller aircraft; these result chiefly from political fragmentation and the desire of each country to have its own carriers not only on domestic routes but also on international flights, particularly those into adjacent countries.

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GEOGRAPHICAL MATERIALS RECEIVED

Wallbank and Fletcher. **Living World History.** Scott, Foresman and Company, 433 East Erie Street, Chicago 11, Illinois. 1958. 767 pages with color and spot maps, charts, photographs, cartoons, study aids, reading lists, index, and pronouncing vocabulary. $4.88.

Norton Ginsburg, Editor. **The Pattern of Asia.** Prentice-Hall, Inc., 70 Fifth Avenue, New York 11, New York. 1958. xiv and 929 pages with photographs, maps, and index. $11.65.

Freeman and Morris. **World Geography.** McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, New York. 1958. viii and 623 pages with photographs, maps, glossary, and index. $10.75.

Agnes Allen. **The Story of Archaeology.** Philosophical Library, 15 East 40th Street, New York 16, New York. 1958. 245 pages with sketches and index. $4.75.

William A. Ritchie. **An Introduction to Hudson Valley Prehistory.** New York State Museum and Science Service, The University of the State of New York, Albany, New York. 1958. 112 pages with photographs, maps, and references. $

Integrated River Basin Development. United Nations, Department of Economic and Social Affairs, New York. 1958. 60 pages with a map and annexes. 70¢.

Loyal Durand, Jr. **World Geography.** Henry Holt and Company, 383 Madison Avenue, New York 17, New York. 1958. x and 404 pages with photographs, maps, and index. $6.00.

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